higher prices than the fines, but, of course, it is more difficult to obtain a lump ore with as high a sulphur content as that of fines. As a result, only a few mines or parts of a mine can furnish lump ore and maintain a sufficient sulphur content, whereas suitable fines may be obtained even from deposits in which the pyrites is sparsely disseminated.

No definite lower limit can be placed on the proportion of sulphur that a pyritic ore must contain to be of commercial grade. In practice, however, material containing more than 40 per cent of sulphur is specified, and practically none of the acid companies use material that carries less than 35 per cent of sulphur.

Several elements or substances by no means rare in pyritic ores are objectionable as material to be used in the manufacture of sulphuric acid and decrease the value of the ore in which they occur, or they can be used only by means of special treatment.

Certain elements, arsenic and antimony for instance, are poisonous and have a bad effect on the resulting acid, but some of the larger fertilizer plants do not reject an ore containing less than 1 per cent of arsenic. These elements are also injurious from a manufacturing standpoint if the pyrites is used in plants making acid by the contact process, as they attack the platinum and cause it to lose its efficiency. According to Wilson,* pyrites carrying more than 8 per cent of copper can not be profitably employed in the manufacture of sulphuric acid. Carbonaceous material, such as the coal adhering to the pyrites or "coal brasses," is apparently heavily penalized by acid manufacturers because it yields acid of a dark color. This effect, however, should not prevent pyrites containing some material of this sort being used in making some low-grade acids for the manufacture of fertilizers and similar materials. On the other hand, however, most of the pyrites derived from the coal beds is marcasite, which decomposes readily, sometimes ignites through spontaneous combusion, or oxidizes to sulphuric

*Wilson, A. W. G., Pyrites in Canada: Canada Dept. Mines, Mines Branch, Pub. 167, p. 22, 1912.

acid, and is therefore a dangerous or expensive substance to leave in storage dumps.

Condition of Industry.

During the year of 1918 there were several new pyrites mines opened due to the large decrease in the imports, and to the accompanying high prices of the ore. The large decrease in the amount imported was due in part to the difficulty in obtaining ships for the transportation of the ore from Spain, but was very largely attributable to the action of the Government board in issuing licenses for only a small part of the usual tonnage. Despite the fact that several new mines were opened there was only a slight increase in the domestic production during the year of 1918 as compared with the previous years. The number of tons used in the manufacture of sulphuric acid was far below the amount used in 1917, but the former users of the ore in the manufacturing of sulphuric acid altered their plans slightly and used sulphur instead of pyrites and in this way met the great demand for the acid; thus preventing the decrease in the amount of imported pyrites from affecting the American industry.

Of the total quantity of pyrites produced, 199,472 tons were reported to be lump and 265,022 tons were fines or concentrates. The total sulphur content of the lump ore was 74,504 tons, or an average of slightly more than 37 per cent of sulphur, and that of the fines or concentrates was 110,984 tons, or an average of about 42 per cent of sulphur. The value of the lump ore was $794,117, and of the fines or concentrates $1,850,398; the average price of the lump ore was therefore $3.98 a ton and that of the fines $7 a ton. According to these figures the average price per unit of sulphur in the lump ore was about 10 cents and the fines or concentrates about 16 cents.

Pyrites produced in the United States in 1918, by States.

STATE	LUMP		FINES		TOTAL	
	Quantity (long tons)	Value	Quantity (long tons)	Value	Quantity (long tons)	Value
California	*	*	*	*	111,861	$501,541
Colorado	2,947	$6,935	15,870	$108,777	18,817	115,712
Georgia	9,334	79,526	21,981	189,271	31,315	268,797
Illinois	*	*	*	*	24,369	85,659
Missouri	*	*	*	*	7,674	69,202
New York	*	*	*	*	63,982	422,958
Ohio	9,845	40,215			9,845	40,215
Virginia	85,359	233,572	58,068	607,605	143,427	841,177
Other states†	17,640	138,549	35,564	160,705	53,204	299,254
	‡199,472	‡794,117	‡265,022	‡1,850,398	464,494	2,644,515

*Output of lump and fines are not shown separately, as there are less than three producers of one or the other.

†Includes Alabama, Kentucky, Pennsylvania, South Carolina, South Dakota, Tennessee, and Wisconsin.

‡Includes quantity produced in states whose individual output may not be shown separately.

Production in Alabama.

In 1918 there were three producing pyrites mines in Alabama—those of the National Pyrites & Copper Co., the Southern Sulphur Ore Co., and the L. M. Mining Association. All three of these mines are in the east-central part of the State, in Clay County, near Pyriton. Deposits in this region have been known for some time, but the mines were reopened during 1917, and at the present time are producing a considerable quantity of pyrite.

The deposit at the National Pyrites & Copper Co.'s mine, formerly owned by the Alabama Sulphur Ore & Copper Co., is in schist and consists of irregular lenses, some of them 300 feet long and 35 feet thick. The deposit has been opened by an incline of about 30° slope for a distance of 450 feet, and the average grade of ore shipped is reported to carry about 40 per cent sulphur. Both lump and fines are shipped. The ore also carries about 1 per cent copper.

The conditions at the property of the Southern Sulphur Ore Co.'s mine are essentially the same as at the National Pyrites & Sulphur Co.'s mine, and both lump and fines, containing about 40 per cent of sulphur, are shipped.

The L. M. Mining Association has leased the old Mattison mine, about 2 miles from Pyriton. The ore body is reported to have an average thickness near the surface of about 8 feet, but this decreases in depth so that at the bottom of the shaft, which is 135 feet deep, it is only about 2 feet thick. The ore is reported to have an average content of 42 per cent of sulphur and more than 2 per cent of copper.

Each of the mines in the State reported great difficulty in getting an adequate supply of suitable labor. It is estimated that the combined production for the year was about 25,000 tons.

The general belt in which the ore bodies described occur extends for a considerable distance beyond the area prospected and seems to be worth further investigation. In Coosa County, on Hatchet Creek near Bull Gap, and at the old McGhee gold mine, some pyritic ore has been mined in the past, and probably a small quantity could be quickly obtained if required and possibly a considerable output if systematic exploration and development were undertaken. According to the State geologist of Alabama, however, the pyrites at the Hatchet Creek locality is in irregular concretionary masses and consequently is probably of rather small extent.

A large deposit of what appears to be bedded limonite derived from pyrites is reported in Shinbone Valley, 10 to 15 miles northeast of Pyriton. This appears to be a gossan and if so it is worth testing with the drill, as the indications point to a considerable deposit of pyrites beneath it. W. S. Harper, of Wedowee, Ala., owns some of the properties on which this deposit occurs. Near Stonehill, in Cleburne County, in the vicinity of the Woods copper mine, are two deposits of pyrrhotite and pyrite. The ore is in general similar to that in the Ducktown district, Tenn., and the deposit at one of the localities is said to have been traced more or less continuously

for a distance of 1,200 feet. An analysis of the ore is reported to have shown a content of slightly more than 30 per cent of sulphur.

Numerous reports have been received of indications of pyrites all the way from Chilton County west of Coosa River northeastward to the Georgia-Alabama State line, but details concerning promising localities are not at hand. Some pyrites has been reported near Gold Branch, in Coosa County, also along the eastern flanks of Talladega Mountain, at the old Hog Mountain gold mine, where a vein of pyrites 10 to 15 feet thick has been reported. H. D. McCaskey, of the United States Geological Survey, also noted an apparent gossan at least 30 feet wide and possibly 50 feet wide on the south flank of Horseblock Mountain near the Chulafinnee-Abel road. This type of material trends about east and west and outcrops of it or of similar deposits have been recognized for a distance of about 2 miles. The eastern outcrop has been prospected for copper in the past but without success.

PYRITE PRODUCERS IN 1918.

National Pyrites & Copper Co., Pyriton, Ala. Mine at Pyriton, Clay County, Ala.

Southern Sulphur Ore Co., 700 Broadway, Nashville, Tenn. Mine at Pyriton, Clay County, Ala.

L. M. Mining Assn., Pyriton, Ala. Mine at Pyriton, Clay County, Ala.

SILICA.

By Frank J. Katz.

ONLY a very small silica output in 1918 was reported from Trussville, Jefferson County, Ala. The production of silica refractories, cleansing, and abrasive materials in Calhoun and Jefferson counties has ceased. The material quarried is a soft siliceous residue somewhat like the Tripoli mined in Missouri and Illinois.

QUARTZ PRODUCERS IN 1918.

Southern Silica Products Co., Birmingham, Ala. Mine at Trussville, Jefferson County, Ala.

SAND AND GRAVEL.

THE production of sand and gravel in the State in 1918 was 712,787 short tons valued at $406,973 as compared with 476,678 tons valued at $222,011 in 1917, an increase of 236,111 tons of 49.7 per cent, and an increase in value of $184,962 or 82.8 per cent. This does not include more than 40,000 tons of chert dug in the State and valued at more than $17,000.

The quantity of sand produced in the State increased from 355,533 tons in 1917 to 518,565 tons in 1918 or 43.2 per cent, and in value from $139,675 to $262,408 or 88.3 per cent.

There was a large increase in the production of gravel. The increase in the quantity was 28,133 tons or 23.1 per cent, and of $40,617 or 49.5 per cent in value. This increase in all probability was due to the construction of war-time cantonments, railroads, military highways, and other war-time necessities. Ordinary building operations were about the same as in 1917.

Building and molding sands made up 49.3 per cent of the total quantity of the sand produced; building 32.5, moulding 16.8. There was an enormous increase in railroad ballast in 1918. The output increasing from 12,690 tons to 165,131 tons in 1918, an increase of 152,441 tons or 1210 per cent, and in value from $3,014 to $82,980, an increase of $79,966 or 2656 per cent. The sand and gravel products of the State were 1.15 per cent of the total production of the United States.

The following tables give a comparison of the production of sand and gravel in 1918, and 1918, the production, and kinds of sands and gravel for these two years.

Production in short tons of sand and gravel in Alabama in 1917 and 1918.

	SAND		GRAVEL		Total[1]		Percentage of U. S. total
	Quantity	Value	Quantity	Value	Quantity	Value	
1917	355,533	$139,675	121,145	$82,336	476,678	$222,011	0.63
1918	518,565	262,408	149,278	122,953	712,787	406,973	1.15
Increase	153,032	122,733	28,133	40,617	236,109	184,962	
Percentage	43.2	88.3	23.1	49.4	49.7	82.8	

Quantity (short tons), value and kind of sand produced in Alabama in 1917 and 1918.

	Moulding Sand		Building Sand		Paving Sand		Engine Sand		Grinding and Polishing Sand		Railroad Ballast Sand and Gravel		Filter Sand		Total	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
1917	148,355	$54,742	157,167	$67,277	*	*	*	*	*	*	12,690	$3,014	*	$ *	476,678	$222,111
1918	119,975	47,037	230,481	128,806	*	*	*	*	*	*	165,131	82,980	2,978	3,585	712,787	406,933
Increase + or Decrease —	−28,380	− 7,705	+73,374	+61,529							+152,441	+79,966			+236,109	+184,922
Percent'ge	− 18.9	− 14.5	+ 41.5	+ 91.5							+ 1,210	+ 2,656			+ 49.5	+ 83.2

*Concealed because of less than three producers.

SAND AND GRAVEL PRODUCERS IN 1918.

Chickasaw Ship Building Co., Mobile, Ala. Pit in Clarke County, Ala.

Underwood-Walker Co., Birmingham, Ala. Pits at Birmingham and Jackson's Lake, Elmore County, Ala.

Kirkpatrick Sand & Cement Co., 1912 Am. Trust Bldg., Birmingham, Ala. Pit at Jackson's Lake, Elmore County, Ala.

W. P. Clayton, Gadsden, Ala. Pit at Alabama City, Etowah County, Ala.

Illinois Central R. R. Co., 135 E. Eleventh Place, Chicago, Ill. Pit at Macon County, Ala.

Mobile Gulf Navigation Co., Mobile, Ala. Pit at (Pearson's Landing) Tombigbee River, Mobile County, Ala.

Cook & Laurie Gravel Co., 14 Coosa St., Montgomery, Ala. Pit at Cooks, Montgomery County, Ala.

Atlantic Coast Line R. R. Co., J. E. Willoughby, Chief Engr., Wilmington, N. C. Pits at Jackson, Midland City, Montgomery, and in Pike County, Ala.

Carreker Bros. & Co., Cook Springs, Ala. Pit at Cook Springs, St. Clair County, Ala.

W. Q. Whitfield & Co., Cook Springs, Ala. Pit at Cook Springs, St. Clair County, Ala.

H. Riggan, Cook Springs, Ala. Pit at Cook Springs, St. Clair County, Ala.

STONE.

G. F. Loughlin.
Eugene A. Smith.

ON ACCOUNT of the variety of uses to which stone is put, there is no regular unit of measurement, and the figures in this report represent the values of the different varieties.

Production.

GENERAL CONDITIONS IN 1918.

The year 1918, as was to be expected, was a most disastrous one for the stone industry in general. Some of the leading products, notably crushed stone, building stone, and paving stone were regarded as "less essential" to war activities, except for local construction work, and

the natural stagnation of construction work was thus intensified by restrictions placed by the War Industries Board upon output, labor supply, and transportation facilities. Several rock products, however, although not hailed as "war minerals," were nevertheless very essential to the successful prosecution of the war. Limestone for flux and various important chemical uses, and dolomite and ganister for refractory use were most noteworthy in this respect, and proposed novel uses of vesicular basalt for lightweight aggregate in concrete ships and of large granite blocks for the walls of acid towers illustrated other special war-time uses of "less essential" materials that bade fair to be realized, had the war continued for a year longer. These war-time uses are considered in the sections devoted to the respective stones.

Crushed stone, although its production was greatly curtailed during the war, must nevertheless be regarded as a war material. One of the first projects carried out by the National Research Council was an investigation of the materials available for rapid road construction in the States along the Atlantic and Gulf coasts. Large quantities of crushed stone were used in construction of roads in the vicinity of cantonments and other military and industrial centers where improvement of roads was of prime importance, but these were far from enough to offset the decrease in use elsewhere, which was intensified by lack of transportation facilities.

There are three kinds of stone produced in Alabama, viz; limestone, marble, and sandstone.

There was a slight increase in the value of the stone produced in the State in 1918, an increase of 3.6 per cent as compared with 1917. The greater part of this increase was in limestone supplied to metallurgical and manufacturing plants. (Mostly furnace flux). There was a decrease of 15.3 per cent in the value of the sandstone produced in 1918, as compared with 1917.

The production of marble decreased nearly 10 per cent in 1918, but the State retained its rank of fourth among the marble producing states. The quantity sold for monumental and building purposes decreased about 25

per cent, whereas stone sold for other purposes (terrazzo, flux, pulverized marble, and riprap) showed a larger tonnage than in 1917.

Exact figures however for marble cannot be given as there were in 1918 as well as in 1917 only two producers.

Total value of stone (limestone, sandstone and marble) produced in Alabama in 1917 and 1918. Percentage of total U. S. value, rank of State and number of plants.

Year	Total Value	Percentage of total U. S. value	Number of Plants	Rank of State
1917	$1,611,497	1.96	29	19
1918	1,669,721	2.02	23	15
Increase in 1918	58,224			
Percentage	3.6			

LIMESTONE.

The most extensive use of the limestone produced in Alabama in 1918 as well as in 1917 was for furnace flux. Crushed stone for concrete came second, but the value was small compared with that of furnace flux. For the other uses given in the table limestone shows a slight decrease.

The limestone burned into lime or used in the manufacture of Portland cement is not taken into account here, but is included in the value of each of the finished products in whose manufacture it was used.

The total value of the limestone sold in the state in 1918 was $1,370,667 as compared with $1,278,908 in 1917, an increase of 7.2 per cent.

The value of limestone produced in Alabama in 1917 and 1918 classified according to uses of the stone is given in the following table:

Value of limestone (not including marble) produced in Alabama in 1917 and 1918, according to uses.

USES	1917	1918	Increase or Dec'se	Percent.
Rough building				
Dressed building				
Riprap	$4,052			
Crushed Stone:				
Road making	$14,170			
Railroad ballast				
Concrete	54,368	$23,548	—$30,820	— 56.8
Flux	1,159,035	1,060,121	— 92,914	— 8
Agricultural	8,428	8,266	— 162	— 1.92
Other		230,017		

LIMESTONE FOR BUILDING PURPOSES.

The preparation of cut stone for building purposes in Alabama, while on the increase, is not yet what is should be. Practically all of this material comes from the quarries in the Subcarboniferous limestone of the Tennessee Valley, the most important quarries being at Rockwood, in Franklin County, operated by Foster and Creighton Co., of Nashville. This stone is quite similar in appearance, composition, and other qualities to the Indiana stone, and so far as experience in the use of the stone from the two localities in the buildings of the University of Alabama goes, the Alabama stone holds its own under influence of the weather better than does the Indiana stone. Stone steps, door sills, and window sills, buttress caps, etc., of the Alabama stone put in place in 1885 show practically no deterioration in color and wear under foot, and in crumbling and roughening under the influence of the weather, which cannot be said of some portions of the Indiana stone used in buildings erected in 1909-10. The Rockwood quarries have most modern and approved methods of machinery for sawing the stone and handling it in transit to the mills and elsewhere. The stone is of massive formation, of great thickness and extent. Blocks weighing as much as 25 tons, without crack or flaw, are

not infrequently quarried, the size of the blocks being practically limited only by the capacity of the hoisting machinery. These quarries were taken over by the Government in July, 1918, and the output of building stone was greatly curtailed. It was the plan of the Government to operate these quarries in connection with the nitrate plants in that vicinity, the stone being of the desired quality and the supply practically unlimited. A considerable amount of new machinery was placed in the quarries and operations were begun on a large scale. The quarries were returned to the owners in March, 1919.

The Oolitic variety is most extensively used for building and monumental work. It is of light gray color, uniform grain, and homogeneous texture. It possesses the quality of cheapness, it can be cut to any design required, and it is at the same time strong and durable.

If adequate machinery for doing finishing work was installed at the quarry there would no longer be any reason for going out of the State for this grade of stone. Already the material has been very extensively used in public buildings in Mississippi, Tennessee, as well as in Alabama. The only reason why it was not used in the recently erected buildings at the University of Alabama was that at the time these building contracts were let, the quarries furnished only the rough sawn stone and there was not in Alabama any establishment adequately equipped for the dressing of the stone in the quantity needed.

The above statements are confirmed by a report on the comparative tests made on the Rockwood stone, and those from Bedford, Ind., and Bowling Green, Ky., by Prof. Robert H. McNeilly, in the Engineering Laboratory of Vanderbilt University.

From this report I give the following extracts:

"GENERAL CHARACTERISTICS.—The Rockwood limestone is an almost pure oolitic limestone with frequent small crystals of calcite distributed throughout its mass. It resembles closely the Bedford stone in appearance, except that it has a slightly more open texture. The Bowling Green stone is finer in grain, softer and more easily pulverized than either the Bedford or Rockwood stones, and contains an appreciable amount of petroleum, which

lends somewhat to the ease with which it is worked. In all three stones the texture is exceptionally uniform, as it is almost impossible to detect the bedding planes by eye; however in this respect the Bowling Green stone is most marked, and it is frequently necessary to test by hammer to detect which is the bed plane. Rockwood stone is lighter in color than either the Bedford or Bowling Green stones.

"CHEMICAL ANALYSIS.—The following is an analysis of the Rockwood stone made at my request by Dr. Paul C. Bowers, Chief Chemist of the Tennessee Geological Department:

	Rockwood Stone.
Moisture and loss on heating to 175° C.	0.07
Insoluble siliceous residue (SiO_2, etc.)	0.49
Oxide of Iron and Alumina (Fe_2O_3 & Al_2O_3)	0.30
Carbonate of Lime ($CaCO_3$)	98.23
Carbonate of Magnesia ($MgCO_3$)	0.97
Total	100.06

"PHYSICAL TESTS.—Comparative physical tests of the three samples of stone were made as follows:

Loss in weight on drying,
Cross bending tests,
Compression tests,
Absorption tests,
Per cent of water absorbed,
Specific gravity in bulk, and of puverized stone,
Density,
Abrasion tests.

The results of these physical tests are summarized in the CONCLUSIONS below quoted:

"CONCLUSIONS.—The above tests were made as nearly as possible, under identical conditions, and barring the accidental characteristics of the samples, which were selected at random, these results are believed to represent truly the comparative characteristics of each of the stones under consideration.

"The Rockwood stone shows itself to be a superior building stone to others in every respect except density—but even here, since its absorption of water is the lowest of the three, it should prove more durable, while the

smaller weight per cubic foot can be placed more cheaply on account of freight charges.

"As compared with the Bowling Green stone, the Rockwood shows a decidedly higher strength, and characteristics which indicate a greater durability. The Bowling Green stone, however, is undoubtedly more easily worked than either of the other two stones, due to its being softer and also the presence of oil. This oil has the bad effect of staining the stone itself and the contiguous masonry for several years after it is placed, while the very ease with which the stone can be worked makes the Bowling Green very inferior where used for door sills and steps. This is shown well by the Abraision Test which shows the Rockwood stone in its best light, as a very superior material, for steps, door sills, and other places subject to wear.

"From my examination of these three stones, I believe no builder would make a mistake in using any one of the three, for they are all unquestionably very superior building stones. While each stone may have advantages over the other for some specially desired characteristics, as a building stone for general purposes, each is highly satisfactory.

Respectfully submitted,
ROBERT H. MCNEILLEY,
Assistant Professor of Civil Engineering, Vanderbilt University.

LIMESTONE PRODUCERS IN 1918.

Southern Bitulithic Co., 812 American Trust Bldg., Birmingham, Ala. Mine at Woodstock, Bibb County, Ala.

Cheney Lime Co., Allgood, Ala. Mine at Allgood, Blount County, Ala.

Gulf State Whiting Co., Mobile, Ala. Mine at Glendon, Clarke County, Ala.

C. M. Noble, Anniston, Ala. Mine at Cobb, Etowah County, Ala.

The Alabama Co., Birmingham, Ala. Mines at Rock Springs and Glencoe P. O., Etowah County, Ala.

Woodstock Operating Corp., Anniston, Ala. Mine at Rock Springs, Etowah County, Ala.

Foster & Creighton Co., 807 First Nat. Bank Bldg., Nashville, Tenn. Mine at Rockwood, Franklin County, Ala.

Gulf States Steel Co., Boyles or Birmingham, Ala. Mine at Boyles, Jefferson County, Ala.

Warrior Timber & Contracting Co., C. McCormack, Pres., 226 Woodward Bldg., Birmingham, Ala. Mines at Boyles and Gate City, Jefferson County, Ala.

Dolcito Quarry Co., R. D. No. 6, Box 500, Birmingham, Ala. Mine at Dolcito, Jefferson County, Ala.

McDonough Ore & Mining Co., 540 Brown-Marx Bldg., Birmingham, Ala. Mine at Gate City, Jefferson County, Ala.

Tenn. Coal, Iron & R. R. Co., Brown-Marx Bldg., Birmingham, Ala. Mines at Ketona and Vanns, Jefferson County, Ala.

Sloss-Sheffield Steel & Iron Co., Birmingham, Ala. Mine at N. Birmingham, Jefferson County, Ala.

Republic Iron & Steel Co., Birmingham, Ala. Mine at Thomas, Jefferson County, Ala.

W. B. McCulloch, R. D., Albany, Ala. Mine at New Decatur, Morgan County, Ala.

Keystone Lime Co., Charleston, S. C. Mine at Keystone, Shelby County, Ala.

MARBLE.

The marble of Alabama is of two kinds, crystalline, or true marble, and non-crystalline.

The crystalline or statuary marble occurs mainly in a narrow valley along the western border of the metamorphic area, extending from Marble Valley in Coosa County, through Talladega into Calhoun. The length of the marble belt through Coosa and Talladega counties is about 50 miles. The width of the valley carrying the marble as a rule is from one-quarter to one-half mile, widening in places to a mile and a quarter, for example in the neighborhood of Sylacauga.

The quarries longest known are Gantt's and Herd's near Sylacauga, Nix's near Sycamore, Bowie's near Rendalia, and Taylor's and McKenzie's near Taylor's Mill, east of Talladega. From all of these marble was quarried before the civil war.

During 1918 two companies reported production of marble in Alabama, viz., the Alabama Marble Company at Gantt's Quarry and the Moretti-Harrah Company, whose quarry adjoins that of the Alabama Marble Company at Gantt's. The other quarries mentioned are in Talladega County, near Sylacauga.

The plant of the Alabama Marble Company at Gantt's Quarry which was completely destroyed by fire in December, 1910, has been rebuilt and equipped with all the ma-

chinery needed for the working up of any kind of finished product.

I think it is fairly safe to say that on the whole the marble from this quarry and immediate vicinity is of the highest grade of commercial white marble now on the market and obtainable in large quantity. There are small quantities of marble produced both in Italy and Vermont that are somewhat freer from coloring matter than the best grades that can be produced in Alabama in any quantity. But on the other hand, the poorest grades in Alabama greatly surpass the poorest grades produced elsewhere, so that the average of the Alabama deposit is probably somewhat higher than that of any other so far developed, not excluding even the marble from the Carrara district in Italy. The marble from this State (Gantt's Quarry) has now a well established reputation and has been used in more than 200 important buildings throughout the United States.

It can be seen in the galleries of the National Museum in Washington.

The Moretti-Harrah Company furnishes the marble in blocks for monumental and rough interior purposes.

A beautiful quality of variegated limestone or marble—red, pink and white—belonging probably to the Cambrian formation, occurs in Shelby County, a mile or two south of Shelby Springs station on the L. & N. railroad, and extending thence southwest for a mile or two. Nothing but prospecting work has been done on this marble. The Trenton limestone in the Appalachian valleys, particularly Jones Valley below Bessemer, contains marble similar to that quarried in the vicinity of Knoxville, Tenn. Also at Pratt's Ferry on the Cahaba River in Bibb County a quarry was for many years worked in this formation and turned out a very beautiful quality of marble varying in color from gray through pink, red and brown shades.

A black marble which is exceedingly promising, has been reported and some development work done near Anniston, and at Piedmont, Calhoun County, and some very handsome specimens of cave onyx have been obtained from near Kymulga in Talladega County.

In the Coastal Plain the St. Stephens limestone of the Tertiary holds ledges of hard, almost crystalline rock capable of taking good polish. The colors vary from nearly white, through shades of yellowish into red, and it would make a handsome decorative marble, especially for inside work.

Other limestone formations, such as the Subcarboniferous and the Knox Dolomite, could in places be drawn upon for marble.

MARBLE PRODUCERS IN 1918.

The Alabama Marble Co., Gantts Quarry, Ala. Quarry at Gantts Quarry, Talladega County, Ala.

Moretti-Harrah Marble Co., Sylacauga, Ala. Quarry at Sylacauga, Talladega County, Ala.

SANDSTONE

The returns from the State to the U. S. Geological Survey office shows a decrease of $2,614 in the total value of sandstone produced in 1918 or 15.3 per cent as compared with the previous year.

By far the greater part of the sand stone produced in Alabama in 1918 was ganister from Rock Run Cherokee County.

The following table will show the limestone and the sandstone production of Alabama from 1913 to 1918, inclusive.

Value of limestone and sandstone production in Alabama, 1913-1918.

KIND	1913	1914	1915	1916	1917	1918
Limestone	$812,664	$787,214	$426,266	$917,559	$1,278,908	$1,370,667
Sandstone	151,111	161,773	30,432	20,995	17,098	14,484

SANDSTONE PRODUCERS IN 1918.

Harbison-Walker Refractories Co., Pittsburgh, Pa. Quarry at Rock Run, Cherokee County, Ala.

J. Black & Sons, 3rd Ave. and 19th St., Birmingham, Ala. Quarries at Woodlawn and Birmingham, Jefferson County, Ala.

W. W. Brooks, Hartselle, Ala. Quarry at Hartselle, Morgan County, Ala.

U. S. Engineer's Office, Tuscaloosa, Ala. Quarry at Lock 12, Warrior River, Tuscaloosa County, Ala.

SUMMARY.

BECAUSE of the difference in the units of measurement employed in the various branches of the mineral industry, a summation of the production of the year can include only the values of the products. It is also to be noted that a simple summation of all the values of the minerals or mineral products listed in this pamphlet would give a value much in excess of the true value, since in many cases, as for instance coal and coke, and iron and pig iron and steel, the second product is directly a product of the first, and the value of the first is included in that of the second. To give the values of both as a part of the total would be to repeat, in a measure, at least a partial value of the first or raw product and would give an erroneous result.

As the Survey has not, however, the figures upon which to base an estimate of the percentage of each product which was used in the manufacture of some other product, the summation of the mineral production of the State as here given will be a simple summation of the values reached by the individual branches of the industry.

According to this rather unsatisfactory manner of summation, which does not include the value of the steel produced, the value of the 1918 raw materials and immediately derived products was $189,426,896 as compared with $158,127,150 in 1917 an increase of $31,299,746 or 19.8 per cent.

The production may be classified as follows:

Raw products	$77,719,831
Pig Iron	80,893,687
Coke	30,813,378
Total	$189,426,896

The more important minerals and products after coal, pig iron and coke, are iron ores, clay products, stone, cement, sand and gravel, and lime given in the order of their relative importance.

Below is a tabular presentation of the value of the mineral products of Alabama, as estimated above for the years 1912, 1913, 1914, 1915, 1916, 1917 and 1918.

Year	Value
1912	$ 60,141,793
1913	67,530,089
1914	56,769,559
1915	61,791,958
1916	94,987,229
1917	158,008,952
1918	189,426,896

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